Bonneville Power Administration
Power Business Line

2003 Safety-Net Cost Recovery Adjustment Clause

Rebuttal Testimony

SN-03-E-BPA-16 RISK ANALYSIS

May 2003

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REBUTTAL TESTIMONY OF

SIDNEY L. CONGER, JR., ARNOLD L. WAGNER, AND BYRNE E. LOVELL

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SUBJECT: RISK ANALYSIS

Section 1. Introduction and Purpose of Testimony

Q. Please state the purpose of this testimony.

A. The purpose of this testimony is to rebut the arguments raised by parties regarding Bonneville Power Administration's (BPA) Risk Analysis.

Section 2. Adequacy of Risk Analysis

Q. The Columbia River Inter-Tribal Fish Commission and Yakama Nation (CRITFC) argues that BPA's rate proposal will likely not result in a financially strong institution that can meet its costs in a competitive power market. Reasons provided by CRITFC are that BPA's proposal does not adequately address the costs and uncertainties facing the agency and BPA's proposal utilizes a number of risk mitigation strategies that it assumed in the WP-02 rate case. CRITFC claims that this will make it harder for BPA to maintain financial health when some of the uncertainties facing the agency materialize. Sheets, et al., SN-03-E-CR/YA-01, at 5. Please respond.

A. It is unclear from CRITFC's testimony why they believe that BPA's use of a number of risk mitigation strategies BPA assumed in the WP-02 rate case makes it harder for BPA to maintain financial health when some of the uncertainties facing the agency materialize. No examples or arguments are linked to this statement. However, BPA believes this statement is without merit, given the flexibility provided by the FB CRAC and SN CRAC rate design in the WP-02 rate case, which allows BPA to modify its rates depending on its financial condition. BPA also does not agree with CRITFC's argument that BPA's proposal does not adequately address the costs and uncertainties facing the agency. BPA

has addressed in its Risk Analysis and its various other studies, documentation, and testimony its costs and uncertainties in this SN CRAC rate proposal, while also setting rates that are competitive and provide sufficient assurance that BPA will have made all its payments to the U.S. Treasury by the end of the rate period.

Q. *CRITFC argues that BPA's rate proposal will potentially limit BPA's ability to address higher future costs while keeping its rate competitive with the power market due to failure to build adequate reserves and fewer shock absorbers to address some of the risk that the agency faces in an emergency. CRITFC supports its claim by noting that BPA's rate proposal results in an expected value for ending reserves in 2006 of $348 million and, unlike in the WP-02 rate proposal, BPA is relying on TBL reserves in this rate proposal. Sheets, et al., SN-03-E-CR/YA-01, at 6-7. Please respond.*

A. To the extent that CRITCF is raising issues regarding the adequacy of rates to address higher future cost beyond the end of the current rate period, those issues are beyond the scope of this SN CRAC rate case. BPA will be addressing BPA's competitiveness in its Regional Dialogue forum and subsequent FY 2007 through 2011 rate case.

In regard to the current rate period, BPA has accounted for its costs and uncertainties in this SN CRAC rate proposal, while setting rates that are competitive, cover its costs, and provide sufficient assurance that BPA will have made all its payments to the U.S. Treasury by the end of the rate period. BPA is in an unusual situation now. The west coast power market has been more volatile than usual for the last 2 years – the first 2 years of the 2002–2006 rate period. Concurrent with these developments in the west coast power market, the national economy has entered a recession and the Pacific Northwest economy has been battered especially hard with the unemployment rates in Oregon and Washington being among the highest in the nation. BPA must strike a balance among many statutory directives–providing reliable, economic power, working to assure the survival of fish stocks, promoting conservation, and delivering other

benefits to the region. BPA believes that its SN CRAC rate proposal represents a reasonable balance. BPA notes that in the 1993 rate case and the May 2000 rate proposal BPA relaxed its TPP standards to take into account the impact that the much-higher rates needed to achieve the 95 percent TPP called for in the 10-Year Financial Plan adopted in the 1993 rate case would have on the regional economy. With regard to shock absorbers, BPA comments that the drought of 2001 (the effects of which extended into 2002) and the power market price disruptions of 2001–2002 constitute significant shocks. It is to be expected that, after absorbing such major shocks, BPA's ability to absorb further shocks has been reduced. Neither BPA nor any other entity has an unlimited ability to absorb shocks. One part of BPA's response to these shocks is the incorporation of TBL reserves in the implementation of TPP standards in this rate case. BPA had not relied in previous PBL rate cases on the implied support of TBL reserves; keeping those reserves separate had never been part of the way that BPA planned to provide 'shock absorbers.' While CRITFC notes that the expected value of ending 2006 reserves in BPA's Initial SN CRAC Proposal is lower than the corresponding figure in the WP-02 rate case, BPA believes that its proposal is a reasonable balance among competing objectives. BPA's ability to meet potentially higher costs in the future is substantial. The majority of BPA's firm load is covered by 10-year contracts, extending though FY 2011, which provide a very sound financial base for BPA.

When you consider all of the elements of BPA's SN CRAC rate proposal that include the TPP, TRP and Net Revenue standards, BPA believes that it has adequately addressed the issues raised by CRITFC.

Section 3. Natural Gas Price Risk

Q. CRITFC argues that BPA has not adequately addressed the uncertainty associated with natural gas volatility because BPA is not using historical price data to forecast forward volatility. See Sheets, et al., SN-03-E-CR/YA-01, at 48-49. Did BPA provide information

to CRITFC regarding whether or not BPA analyzed and used historical levels of natural gas price volatility in its Risk Analysis?

A. Yes. BPA described in data response CR-YA-BPA: 060 (*see* Attachment A, SN-03-E-BPA-16A) how it analyzed and used historical natural gas price volatility when simulating future natural gas price risk. BPA also documented this process in the Documentation of the Risk Analysis. *See* SN-03-E-BPA-02, at 6-39 to 6-49.

Q. CRITFC argues that the AURORA model used by BPA simulates future natural gas prices on a high, medium and low natural gas forecast, which assume a fairly constant price. See Sheets, et al., SN-03-E-CR/YA-01, at 48-49. Please respond.

A. CRITFC's testimony reflects a misunderstanding about the methodology used in the Risk Analysis. This misunderstanding is reflected in CRITFC's response to BPA data request BPA-CR/YA-003 (*see* Attachment B, SN-03-E-BPA-16B). In this data response, CRITFC indicates that they assumed that BPA incorporates natural gas price uncertainty in its Risk Analysis similar to the method used by the Northwest Power Planning Council. Such an assumption is erroneous. In BPA's Risk Analysis, the AURORA model does not simulate future natural gas prices and BPA does not simulate future natural gas prices on a high, medium, and low natural gas forecast assuming a fairly constant price. Future natural gas price risk is simulated by the Natural Gas Price Risk Model (NGPRM), which is one of the risk simulation models that comprises RiskSim, a component of RiskMod. The NGPRM simulates various patterns of gas prices around a base case gas price forecast, which yields a probability distribution of potential future gas prices. Under this methodology, no high or low natural gas price forecasts are used. The simulated natural gas prices from the NGPRM are then input into the AURORA model, which then outputs the associated electricity prices. This methodology has been described in detail in the Documentation of the Risk Analysis. *See* SN-03-E-BPA-02, at 6-39 to 6-50.

Q. CRITFC cites a graph (attachment SN-03-E-CR-01TTTT) prepared by PacifiCorp showing historical NYMEX gas price data from 1990 through 2001, including price spikes, and claims that AURORA simulations ignore this historic volatility. See *Sheets,* et al.*, SN-03-E-CR/YA-01, at 49. Please respond.*

A. BPA does not agree with CRITFC's claim that it did not use historical natural gas price volatility, including price spikes, in the Risk Analysis. BPA used a different source of historical natural gas prices to estimate natural gas price volatility than the historical 20-day natural gas price volatility shown in the graph of NYMEX Natural Gas Prices from 1990 through 2001. The historical NYMEX Natural Gas Prices are forward market price quotes at Henry Hub, Louisiana. In contrast, BPA described in the Documentation of the Risk Analysis (s*ee* SN-03-E-BPA-02, at 6-39 to 6-50) and indicated in data response CR-YA-BPA: 060 (*see* Attachment A) that it used historical monthly spot market prices at Ignacio, Colorado from January 1989 to December 2002 as the basis for its estimate of historical natural gas price volatility. BPA also explained in CR-YA-BPA: 060 why it selected spot market prices at Ignacio, Colorado, which are more relevant prices for West Coast gas prices than forward market prices at Henry Hub, Louisiana. Also, as discussed in the previous answer, the AURORA model does not simulate future natural gas prices in the Risk Analysis.

Q. CRITFC argues that the uncertainty of BPA's gas forecast would affect both the cost of power BPA purchases for augmentation and the value of secondary sales. See Sheets, et al., SN-03-E-CR/YA-01, at 49. Please respond.

A. BPA agrees with CRITFC that the uncertainty of BPA's gas forecast would affect both the cost of power of BPA purchases for augmentation and the value of secondary sales. This is why BPA includes gas price risk in the Risk Analysis so that the AURORA electricity prices associated with the gas price risk are used to estimate secondary energy revenue and power purchase expense risk in RiskMod.

Section 4. Electricity Price Risk

Q. CRITFC argues that BPA has not adequately addressed the uncertainty associated with the West Coast market by not modeling in the Risk Analysis the kind of price uncertainty seen in California during 2000 and 2001. See Sheets, et al., SN-03-E-CR/YA-01, at 49. Please respond.

A. BPA does not agree with CRITFC's claim. BPA stated in data response CR-YA-BPA: 057 (*see* Attachment C, SN-03-E-BPA-16C) and CR-YA-BPA: 059 (*see* Attachment D, SN-03-E-BPA-16D) the reasons why BPA believes that it is very unlikely that the kind of price uncertainty seen in California during 2000 and 2001 will occur in FY 2004 through FY 2006. In summary, BPA believes because of FERC intervention into the west coast markets, as well as the increase in capacity and reduction in demand since the crisis, it unlikely that the west coast will see the extreme electricity price volatility seen during 2000-2001. In addition to the reasons provided in these data responses, such high electricity prices during FY 2004 through 2006, even under poor water conditions, will likely be more beneficial to BPA than detrimental. The reason being that BPA is over-augmented, even under critical water conditions. Under such a load and resource condition, it is unlikely that BPA would have to purchase additional power, but instead would be selling surplus energy. This condition would likely result in BPA earning higher surplus energy revenues and net revenues than it otherwise would under lower electricity prices.

Q. CRITFC argues that BPA revealed during Financial Choices that it overestimated its secondary revenues by $710 million. Based upon this fact, they contend that BPA should assume there should be significant uncertainty during the balance of the rate period. Sheets, et al., SN-03-E-CR/YA-01, at 50. Please respond.

A. In the context of surplus energy revenues, it is unclear from CRITFC testimony what they mean that BPA should assume significant uncertainty during the balance of the rate

period. They provided no proposed course of action or remedy for achieving this goal. However, BPA believes its Risk Analysis accounts for a significant amount of uncertainty in BPA's surplus energy revenues due to both quantity and price risk. The overestimate of secondary revenues by $710 million cited by CRITFC in data response IN-BPA: 035 was due to lower than originally expected prices received for surplus energy sales during FY 2002 through FY 2006 and approximately 600 aMW of lower generation in FY 2002 than expected, compared to when rates were set in June 2001. At the time of the estimate (June 2001), prices were at record levels and BPA forecasted that prices would remain high for at least two years. Prices dropped significantly after FERC intervention into the market during the summer of 2001. In addition the loss of generation was due in large measure to a record drought in 2001 and the carryover effects of it into 2002.

The $710 million consists of lower than expected prices, which amounted to a reduction of $610 million ($360 million in FY 2002 and $250 million in FY 2003 through FY 2006) in surplus energy revenues, and lower generation in FY 2002, which amounted to a reduction of $100 million in surplus energy revenues. In both the June 2001 rate proposal and this SN CRAC rate proposal the type of generation risk experienced in FY 2002 was accounted for in the Risk Analysis. In contrast with the June 2001 rate proposal when BPA's forecast of surplus energy revenues was high because electricity prices were high, BPA's forecast of surplus energy revenues in this SN CRAC rate proposal is lower because expected electricity prices are much lower. This lower forecast, in conjunction with the price risk reflected in the Risk Analysis, substantially reduces the chances that BPA has substantially underestimated its surplus energy revenue risk in this SN CRAC rate proposal.

Section 5. Columbia Generation Station Risk

Q. Save our Wild Salmon and NW Energy Coalition (SOS) argue that BPA has not

adequately accounted for the future risk of ENW's Columbia Generating Station (CGS) nuclear plant in its Risk Analysis because its risk methodology is based on historical CGS output data with some modifications. Accordingly, SOS claims that BPA assumes the future will be essentially the same as the past. Weiss, SN-03-E-SA-01, at 11. Please respond.

A. BPA does not agree with SOS's claim. While it is true that BPA calibrated the CGS Nuclear Plant Risk Model so that the expected value for the simulated output for CGS is the same as the expected CGS output in the Loads and Resources Study, this calibration is not equivalent to BPA assuming that the future will be similar to the past. BPA incorporated many different CGS output outcomes in the Risk Analysis by simulating CGS output levels that vary considerably from the historical output of CGS (*see* SN-03-E-BPA-01, at page 6-7 and SN-03-E-BPA-02, at pages 6-50 and 6-51). The potential simulated CGS output levels can vary from the output capacity of the plant to zero output. The reason that BPA developed a risk simulation model for the output of the CGS nuclear plant was to account for outcomes that differed from the historical output of the plant.

Q. SOS argues that BPA should include in the Risk Analysis the risk of expensive repairs or premature decommissioning based on consulting Nuclear Regulatory Commission statistics on the likelihood of these sort of events occurring for nuclear plants of the type and age of CGS. Weiss, SN-03-E-SA-01, at 11. Please respond.

A. BPA does not agree with SOS's claim. BPA does not need to model these risks in this Risk Analysis because BPA carries both business interruption and property insurance and pays into a decommissioning fund. These costs are included in BPA's revenue requirement. The insurance covers many of the costs associated with prolonged closures due to accidents or expensive repairs. Though not all costs would be covered, the insurance is sufficient to justify not modeling these risks. Therefore, since the premiums

for the insurance are in the revenue requirement, BPA would be double-counting the costs of such outages if it also modeled these risks.

Q. Does this conclude your testimony?

A. Yes.

Attachment A

SN-03 BPA Data Response

Request No.: CR-YA-BPA: 060

Request: Witnesses: Conger, Wagner, Lovell
Exhibit: SN-03-E-BPA-07, Testimony of Conger, Wagner, Lovell, p. 4, ln. 19.

Please provide any data, analysis, documentation and related materials on how the BPA risk analysis of natural gas volatility compares to historical yearly and monthly volatility in the Northwest and West Coast natural gas markets.

Please explain your answer and provide all relevant documentation and analyses, including email and other correspondence.

Response:

The Testimony cited and the questions posed in this data request are inconsistent. The citation refers to a discussion of the appropriateness of using log normal probability distributions, whereas the question is regarding how the BPA risk analysis of natural gas price volatility compares to historical yearly and monthly price volatility in the Northwest and West Coast natural gas markets. Below is BPA's response to the questions.

BPA's approach to quantifying natural gas price risk in the Natural Gas Price Risk model relies on estimating natural gas price volatility from historical monthly and yearly price data at Ignacio, Colorado, which is a major western United States natural gas hub. *See* SN-03-E-BPA-02, at 6-40 through 6-50. Ignacio is the western United States natural gas hub that is representative of the San Juan Basin, which is the natural gas production area that is most representative of the marginal field gate gas prices to California and various other locations in the West Coast natural gas market. *See* SN-03-E-BPA-01 at 4-9.

Delivered natural gas prices at various locations throughout the West Coast often reflect Ignacio natural gas commodity prices adjusted for different pipeline transportation charges. For this reason, Ignacio natural gas price volatility comprises much of the price volatility reflected in natural gas prices at various West Coast points of delivery. Thus, BPA's approach calibrates gas price volatility to the historical spot market price volatility at the most representative field gate gas delivery point that often underlies prices at various delivery points on the West Coast. By following this approach, natural gas price risk can be simulated for all areas throughout the WSCC by adjusting for expected locational price differentials (basis).

Another reason that BPA decided to use the historical natural gas price volatility at Ignacio is the importance that the cost of natural gas for gas-fired generation in California has on market-clearing electricity prices in both the West Coast and the Northwest. Because of large intertie

transmission lines throughout the Northwest and the West Coast, West Coast electricity prices are normally based on the cost of operating gas-fired generation in California, not the cost of operating gas-fired generation in the Northwest.

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Attachment B

SN-03-CR/YA Data Response

Request No.: BPA-CR/YA-003

Request: Witnesses: Sheets, et al
Exhibit: On page 48, line 21, to page 49, line 9

Please provide the source of information indicating that BPA uses AURORA to simulate future natural gas prices based on high, medium, and low natural gas price forecasts and that these forecasts assume a fairly constant price.

Response:

Attachment BPA-CR-YA-003A.ppt is a PowerPoint presentation by the Northwest Power Planning Council. It includes a summary of the assumptions used for natural gas prices in AURORA. Please note that slides 12 and 13 address this issue specifically. It is our understanding that the natural gas algorithm in AURORA is similar in both the Council and BPA analysis.

April 29, 2003 Data Response:BPA-CR/YA-003

Attachment C

SN-03 BPA Data Response

Request No.: CR-YA-BPA: 057

Request: Witnesses: Conger, Wagner, Lovell
Exhibit: SN-03-E-BPA-07, Testimony of Conger, Wagner, Lovell, p. 4, ln. 3.

Please provide any data, analysis, documentation or related materials regarding the decision to future market price uncertainty. We are particularly interested in whether BPA considered the potential that future prices could be as volatile as those experienced in 2000-2001.

Please explain your answer and provide all relevant documentation and analyses, including email and other correspondence.

Response:

Using AURORA, BPA models market volatility in the future. In the risk runs, BPA does forecast very high and low prices under certain conditions. (In fact, the AURORA runs reflect that it is possible, at a small probability, for monthly electricity prices to be in the $100/MWh to $300/MWh range (*See* SN-03-E-BPA-01, Pages 4-13 and 4-14)). Furthermore, there have been some changes to the market that may alleviate the extreme prices we saw in 2000 and 2001. First, FERC has implemented a $250/MWh west wide price cap. BPA is forecasting that the price cap will stay in place throughout the rate period. Second, the amount of load in the PNW has decreased dramatically (mostly due to the DSIs) which results in a decrease of roughly 3,000 aMW of load. Also, new generation has been added in the WECC and PNW since 2000 - 2001. The addition of resources and decrease in loads has resulted in a much improved load and resource balance compared to the 2000 - 2001 period. This improved load and resource balance condition substantially reduces the risk of market prices in FY 2003 through FY 2006 being as high and volatile as in 2000 - 2001.

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Attachment D

SN-03 BPA Data Response

Request No.: CR-YA-BPA: 059

Request: Witnesses: Conger, Wagner, Lovell
Exhibit: SN-03-E-BPA-07, Testimony of Conger, Wagner, Lovell, p. 4, ln. 3.

Please provide the analysis that demonstrates that similar price manipulations, supply demand imbalances, natural gas price increases, and/or drought conditions are not possible during the remainder of the rate period.

Please explain your answer and provide all relevant documentation and analyses, including email and other correspondence.

Response:

BPA's Risk Analysis incorporates the risk associated with supply/demand imbalances, natural gas price increases, and/or drought conditions during the remainder of the rate period. Results from the Risk Analysis reflect that large price movements during the FY 2003 – FY 2006 are unlikely, but not impossible. Also, BPA considered the probability of experiencing similar price manipulations during the remainder of the rate period to be small considering that resources are adequate to serve all loads under almost all load and resource conditions and changes have been made to the California market structure. FERC has implemented much more stringent market oversight rules since the events of 2000-2001. Market manipulation, while certainly not impossible, is much less likely to be a problem, especially given the recent record of stringent prosecution of offenders by the Department of Justice.

April 10, 2003